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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/733,884

12/03/2003

Ja Suk Lee

OF03P212/US

1568

36872

7590

10/05/2004

THE LAW OFFICES OF ANDREW D. FORTNEY, PH.D., P.C.  
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EXAMINER

DANG, TRUNG Q

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/733,884	LEE ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Trung Dang	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/03/03</u> . | 6) <input type="checkbox"/> Other: ____.   |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by  
Jahnes et al. (US 6,380,003 B1).

With reference to Figs. 2c to 2g, the reference anticipates the claims in that it discloses a method of manufacturing a semiconductor device, comprising:

forming a first conductive line **52** on a semiconductor substrate **50**;

forming an insulating layer **54** on the semiconductor substrate and the first conductive line;

forming a plurality of via holes **58**, **60** by selectively etching the insulating layer in order to expose the first conductive line **52** (fig. 2c);

forming metal barrier on the insulating layer and in the via holes (col.5, lines 50-55 and claim 17); and

forming a plug by depositing a conductive layer sufficiently to fill the via holes (col. 5, lines 38-41), and then planarizing the conductive layer until the conductive layer is substantially coplanar with the insulating layer (col. 5, lines 33-36 and Fig. 2g).

For claims 2 and 4, see the wide opening portions (Fig. 2f) that are removed using photoresist pattern 64 as an etching mask after the narrow openings are formed.

For claim 3, see col. 4, lines 31-34 for the claimed step of forming a first photoresist pattern on the insulating layer. With regard to the claimed limitation “removing the parts of the insulating layer to a certain thickness by etching the parts of the insulating layer, using the first photoresist pattern as an etching mask...”, Fig. 2c shows parts of the insulating layer 54 are etched to its entire thickness, which is readable on said limitation because “certain thickness” does not limit to any thickness. With regard to the claimed limitation “forming a second photoresist pattern on the insulating layer...”, see photoresist layer 64 in Fig. 2e. With regard to the claimed limitation “forming a plurality of via holes by removing the parts of insulating layer where each via hole will be formed enough to expose the first conductive line, by etching the parts of the insulating layer for each via hole using the second photoresist pattern as an etching mask”, see Fig. 2f wherein exposed parts of insulating layer 54 are removed using the photoresist layer 64 as an etching mask. Note that, openings 66 (Fig. 2f) consisting of wide portions and narrow portions are considered as via holes because upper metal level and lower metal level are connected together via metal plugs filled in these holes. Thus, after completion of the etching, photoresist layer 64 is removed, resulting in the formation of via holes to expose the conductive line 52 as claimed.

For claim 5, see col. 3, line 67 and col. 5, lines 38-41 for the conductive line 52 and the metal plug in the via holes comprise copper.

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trung Dang whose telephone number is 571-272-1857. The examiner can normally be reached on Mon-Friday 9:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Trung Dang  
Primary Examiner  
Art Unit 2823



9/29/04